Docket No.: 501.43644X00

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

Kyosuke ACHIWA

Serial No.   10/797,052

Filed: March 11, 2004

For: CONTROL METHOD FOR STORAGE SYSTEM, STORAGE
             SYSTEM, AND STORAGE DEVICE

PETITION TO MAKE SPECIAL
UNDER 37 CFR §1.102(MPEP §708.02)

April 13, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants hereby petition the Commissioner to make the above-identified

application special in accordance with 37 CFR §1.102(d). Pursuant to MPEP

§708.02(VIII), Applicants state the following.

(A)   This Petition is accompanied by the fee set forth in 37 CFR

§1.17(h). The Commissioner is hereby authorized to charge any additional

payment due, or to credit any overpayment, to Deposit Account No. 50-1417.

(B) All claims are directed to a single invention. If the Office determines

that all claims are not directed to a single invention, Applicant will make an

election without traverse as a prerequisite to the grant of special status.

(C) A pre-examination search has been conducted.

The search was directed to the invention set forth in claims 1-20. The invention is directed to a control method for a storage system comprising: a first information processing device; a second information processing device which is connected so as to be capable of communicating with the first information processing device, and which constitutes a cluster with the first information processing device; a first storage device which is connected so as to be capable of communicating with the first information processing device, and performs writing/reading of data to a first storage area according to a data input/output request transmitted from the first information processing device; and a second storage device which is connected so as to be capable of communicating with the second information processing device, and performs writing/reading of data to a second storage area according to a data input/output request transmitted from the second information processing device; wherein the first storage device and the second storage device are connected so as to be capable of communicating with each other; the second storage device, during a first processing in which the first storage device transmits to the second storage device a replication of the data written to the first storage area, and the second storage device that received the data writes the data to the second storage area, requests first information from the first storage device indicating that a replication of the data written in the first storage area has not yet been transmitted to the second storage device and that the replication of the data has not been written to the second storage area when notice of failover is received from the second

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information processing device; the second storage device notifies the second information processing device that a data input/output request can be received when the first information is received from the first storage device; and the second storage device refers the first information upon receipt of a data read request transmitted from the second information processing device in which failover has occurred, requests the target data of the data read request from the first storage device when it is concluded that the target data of the data read request are stored in the first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the first storage device as per the request.

The search of the above features was conducted in the following areas: class 707, subclasses 200-204, class 711, subclasses 111-114, 154, 156, 161 and 162, and class 714, subclass 5-7, 52 and 54.

Additionally, a computer database search was conducted on the USPTO system EAST.

(D) The following is a list of the references deemed most closely related to the subject matter encompassed by the claims:

U.S. Patent Number	Inventors
5,051,887	BERGER et al.
5,592,618	MICKA et al.
6,618,794	SICOLA et al.
6,671,705	DUPREY et al.

U.S. Patent Publication No.	Inventor(s)
2001/0008008	MORI
2003/0145179	GABBER et al.
2003/0182525	O'CONNELL et al.
2004/0128442	HINSHAW et al.

A copy of each of these references (as well as other references uncovered during the search) is enclosed in an accompanying IDS.

(E) It is submitted that the present invention is patentable over the references for the following reasons.

It is submitted that the cited references, whether considered alone or in combination, fail to disclose or suggest the invention as claimed. In particular, the cited references, at a minimum, fail to disclose or suggest the second storage device requesting first information from the first storage device indicating that a replication of the data written in the first storage area has not yet been transmitted to the second storage device and that the replication of the data has not been written to the second storage area when notice of failover is received from the second information processing device, and/or the second storage device refers the first information upon receipt of a data read request transmitted from the second information processing device in which failover has occurred, requests the target data of the data read request from the first storage device

when it is concluded that the target data of the data read request are stored in the first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the first storage device as per the request.

All of the independent claims recite at least one of these features or this feature, if there is only one. In particular, independent claim 1 recites the second storage device requests first information from the first storage device indicating that a replication of the data written in the first storage area has not yet been transmitted to the second storage device and that the replication of the data has not been written to the second storage area when notice of failover is received from the second information processing device, and the second storage device refers the first information upon receipt of a data read request transmitted from the second information processing device in which failover has occurred, requests the target data of the data read request from the first storage device when it is concluded that the target data of the data read request are stored in the first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the first storage device as per the request. Independent claim 8 recites when notice of failover is received from the second information processing device during execution of the first processing, the channel controller requests first information from the first storage device indicating that the replication of the data written in the first storage area has not yet been transmitted to the second storage device, and that a replication of the data has not been written to the second storage area, and that

the channel controller refers the first information when a data read request transmitted from the second information processing device in which failover has occurred is received, requests the target data of the data read request from the first storage device when it is concluded that the target data of the data read request are stored in the first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the first storage device as per the request. Independent claim 15 recites when notice of failover is received from the second information processing device during executing of the first processing, the channel controller requests first information from the other storage device indicating that a replication of the data written in the first storage area has not yet been transmitted to the storage device, and that a replication of the data has not been written to the second storage area, and that the channel controller refers the first information when a data read request transmitted from the second information processing device in which failover has occurred is received, requests the target data of the data read request from the other storage device when it is concluded that the target data of the data read request are stored in the first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the other storage device as per the request. Independent claim 18 recites when notice of failback is received from the first information processing device during execution of the first processing, the channel controller requests second information from the other storage device indicating that the data written in the third storage area has not yet been

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transmitted to the storage device, and that the data has not been written to the first storage area, and that the channel controller refers the second information when a data read request transmitted from the first information processing device in which failback has occurred is received, requests the target data of the data read request from the other storage device when it is concluded that the target data of the data read request are stored in the third storage area, and transmits to the first information processing device the target data of the data read request transmitted from the second information processing device as per the request.

The references considered most closely related to the claimed invention are briefly discussed below:

U.S. Patent No. 5,051,887 (Berger et al.) discloses a system that manages storage devices and maintains synchronization between a first and second data storage device. The system includes a set of tables to indicate which records to update, and uniquely identifies fields on the data storage devices for the purpose of duplicating the fields to another medium. The system performs a dual copy function, using a set of status information, to allow only the changed records to be copied to a secondary device of the dual copy. (See, e.g., Abstract and column 2, lines 19-49.) However, unlike the present invention, Berger et al. do not disclose that a second storage device requests first information from a first storage device indicating that a replication of data written in the first storage area has not yet been transmitted to a second storage area when notice of failover is received from a second information processing device.

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U.S. Patent No. 5,592,618 (Micka et al.) discloses a continuously running remote copying system that performs a comparison between data located in a primary site to data located in a secondary site. This system performs a comparison of selected data at a point in time at a primary site with a copy of that data at a secondary site at the same logical point in time in an update sequence. (See, e.g., Abstract and column 4, line 60, through column 6, line 16.) However, unlike the present invention, Micka et al. do not disclose that a second storage device requests first information from a first storage device indicating that a replication of data written in the first storage area has not yet been transmitted to a second storage area when notice of failover is received from a second information processing device.

U.S. Patent No. 6,618,794 (Sicola et al.) discloses a data replication system which generates a virtual point in time copy of a selected volume of a storage system. The system performs a copying of data from a selected volume to a temporary volume. When attempting to read data from the temporary volume, the system checks the bitmap to determine if the requested data has already been copied from the selected volume to the temporary volume. If the requested data has already been copied over to the temporary volume, the data is read from the temporary volume. If not, the data is read from the selected volume. (See, e.g., Abstract, and column 1, line 41, through column 2, line 19.) However, unlike the present invention, Sicola et al. do not disclose that a second

storage device requests first information from a first storage device indicating that a replication of data written in a first storage area has not yet been transmitted to a second storage area when notice of failover is received from a second information processing device.

U.S. Patent No. 6,671,705 (Duprey et al.) discloses a remote mirroring method and system that includes a master storage unit that utilizes a write intent log to resynchronize slave images following a failure in the master storage unit. The write intent log is preserved through the failure, so that the write intent log is available to the master storage unit upon recovery from the failure. The write intent log identifies any portions of the slave images that may be unsynchronized from the master image. The master storage unit resynchronizes only those portions of the slave images that may be unsynchronized as indicated in the write intent log. (See, e.g., Abstract, and column 2, line 66, through column 3, line 19.) However, unlike the present invention, Duprey et al. do not disclose that a second storage device requests first information from a first storage device indicating that a replication of data written in the first storage area has not yet been transmitted to a second storage area when notice of failover is received from a second information processing device.

U.S. Patent Publication No. 2001/0008008 (Mori), discloses an information recording apparatus capable of continuing an appropriate update processing in the case where the data update processing is stopped on one

processing apparatus due to a power failure or memory failure, by using non-updated data stored in duplicate in another processing apparatus. The data is stored temporarily in the memory of one controlling unit and at the same time is stored in a duplicate memory of another controlling unit, so that when the data processing carried out by one controlling unit is stopped, the processing can be continued by the other controlling unit by using the duplicated data. (See, e.g., Abstract and paragraphs 17-20.) However, unlike the present invention, Mori does not disclose that a second storage device requests first information from a first storage device indicating that a replication of data written in the first storage area has not yet been transmitted to the second storage area when notice of failover is received from the second information processing device.

U.S. Patent Publication No. 2003/0145179 (Gabber et al.) discloses a data replication system that includes a host computer, an interconnecting network, and a plurality of storage devices that are divided into host elements and a plurality of storage elements. One or more host elements are associated with the host computer and a storage element is associated with and connected to each of the plurality of storage devices. The host computer and a host element are connected to a plurality of storage devices, in which the data is replicated between the storage devices to maintain data consistency. The host element determines which storage elements do not contain certain up-to-date data in the associated storage device, and then recovers that data from one of the other storage elements and its associated storage device. (See, e.g., Abstract and paragraphs 7-8.) However, unlike the present invention, Grabber et

al. do not disclose that a second storage device refers a first information upon receipt of a data read request transmitted from a second information processing device in which failover has occurred, requests the target data of the data read request from a first storage device when it is concluded that the target data of the data read request is stored in a first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the first storage device as per the request.

U.S. Patent Publication No. 2003/0182525 (O'Connell et al.) discloses a method and system for data migration from an original host storage system to a replacement host storage system. The method and system achieves the data migration, while maintaining continuous access to the data by clients on the network. When a request is made concerning the data stored in either the replacement host storage system or the original host storage system, it is determined whether the data requested has been migrated from the original host storage system to the replacement host storage system. If the data has been migrated, then the replacement host storage system acts on the request. If the data has not been migrated, a search is conducted for the data on the original host storage system, and the data is accessed from the original host storage system. (See, e.g., Abstract and paragraphs 11-19.) However, unlike the present invention, O'Connell et al. do not disclose that a second storage device requests first information from the first storage device indicating that a replication of the data written in the first storage area has not yet been transmitted to the

second storage area when notice of failover is received from the second

information processing device.

U.S. Patent Publication No. 2004/0128442 (Hinshaw et al.) discloses a

method and apparatus for mirroring data. The apparatus includes a plurality of

processing systems, each consisting of one or more disks and a processing unit.

Each disk is comprised of at least two data segments, a first data segment and

one or more secondary data segments, and may have one or more system

segments. Each processing unit is connected to one or more plurality of disks.

Once a failure is detected, the logical mirror of data stored in the first data

segment of the failed disk is accessible from the secondary data segment of a

non-failed disk. The first data segment can be rebuilt on another disk from the

logical mirror stored in the secondary data segment. (See, e.g., Abstract and

paragraphs 6-12.) However, unlike the present invention, Hinshaw et al. do not

disclose that a second storage device requests first information from a first

storage device indicating that a replication of data written in a first storage area

has not yet been transmitted to a second storage area when notice of failover is

received from the second information processing device.

Therefore, since the references fail to disclose the second storage device

requesting first information from the first storage device indicating that a

replication of the data written in the first storage area has not yet been

transmitted to the second storage device and that the replication of the data has

not been written to the second storage area when notice of failover is received from the second information processing device, and/or the second storage device refers the first information upon receipt of a data read request transmitted from the second information processing device in which failover has occurred, requests the target data of the data read request from the first storage device when it is concluded that the target data of the data read request are stored in the first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the first storage device as per the request, it is submitted that all of the claims are patentable over the cited references.
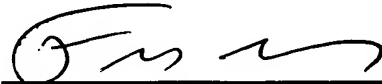
CONCLUSION

Applicant has conducted what it believes to be a reasonable search, but makes no representation that "better" or more relevant prior art does not exist. The Patent Office is urged to conduct its own complete search of the prior art, and to thoroughly examine this application in view of the prior art cited herein and any other prior art that the Patent Office may locate in its own independent search. Further, while Applicant has identified in good faith certain portions of each of the references listed herein in order to provide the requisite detailed discussion of how the claimed subject matter is patentable over the references, the Patent Office should not limit its review to the identified portions but rather, is urged to review and consider the entirety of each reference, and not to rely solely on the identified portions when examining this application.

In view of the foregoing, Applicant requests that this Petition to Make Special be granted and that the application undergo the accelerated examination procedure set forth in MPEP 708.02 VIII.

Respectfully submitted,

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